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Chemometric Determination of the Geographical Origin of Milk Samples in Malaysia

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Abstract : In this work, Inductively Coupled Plasma Mass Spectrometry (ICP-MS), Isotopic Ratio Mass Spectrometry (IRMS) and Ultrasound Milko Tester were used to study milk samples obtained from various geographical locations in Malaysia. ICP-MS was used to determine the concentration of trace elements in milk, water and soil samples obtained from seven dairy farms at different geographical locations in peninsular Malaysia. IRMS was used to analyze the milk samples for isotopic ratios of δ13C, 15N and 18O. Nutritional parameters in the milk samples were determined using an ultrasound milko tester. Data obtained from these measurements were evaluated by Principal Component Analysis (PCA) and Hierarchical Analysis (HA) as a preliminary step in determining geographical origin of these milk samples. It is observed that the isotopic ratios and a number of the nutritional parameters are responsible for the discrimination of the samples. It was also observed that it is possible to determine the geographical origin of these milk samples solely by the isotopic ratios of δ13C, 15N and 18O. The accuracy of the geographical discrimination is demonstrated when several milk samples from a milk factory taken from one of the regions under study were appropriately assigned to the correct PCA cluster.

Keywords : inductively coupled plasma mass spectroscopy ICP-MS, isotope ratio mass spectroscopy IRMS, ultrasound, principal component analysis, hierarchical analysis, geographical origin, milk
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